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Soil influencers in alternative knowledge networks: farmers' soil health learning beyond traditional advisory systems

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Abstract

Agricultural change depends not only on technologies and policies but also on the knowledge infrastructures through which farmers learn to interpret ecological processes and evaluate expertise. In recent years, many soil-health-oriented farmers have begun assembling learning networks that extend beyond conventional advisory systems. This article examines how such networks are formed and what role digitally mediated educators, here termed soil influencers, play within them. The study draws on qualitative interviews and drawing-based elicitation with ten soil-health-oriented farmers in Virginia, USA. The analysis explores how farmers conceptualise soil, how these understandings are shaped through learning pathways, and how they are enacted in everyday soil-care practices. The findings show that farmers often approach soil as a living and evolving system and assemble plural knowledge ecologies that combine peer networks, regional organisations, selective engagement with extension services, and practice-based educators encountered through books, podcasts, courses, and social media. The article argues that soil influencers function as emerging agricultural intermediaries whose authority rests on experiential credibility, demonstrable practice, and interpretive narratives that resonate with farmers' situated ways of knowing. These dynamics point to shifting politics of agricultural expertise and raise questions about how public advisory systems might engage with emerging soil-health knowledge cultures.

Keywords Soil health · Agroecology · Agricultural knowledge systems · Farmer knowledge · Digital knowledge networks · Regenerative agriculture · Agricultural advisory systems · Soil influencers · Soil Stewardship

Abbreviations

AKIS	Agricultural Knowledge and Innovation Systems
NRCS	Natural Resources Conservation Service (United States Department of Agriculture)
CSA	Community Supported Agriculture
VABF	Virginia Association for Biological Farming
VSHC	Virginia Soil Health Coalition
EU	European Union

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Introduction

Agricultural change depends not only on technology or policy, but also on ecological pressures and on the social infrastructures through which farmers and other food system actors learn, share experience, and test new ideas. Formal Agricultural Knowledge and Innovation Systems (AKIS) have historically guided this learning in Europe (White et al. 2023; Nettle et al. 2018; Klerkx et al. 2010; Ingram 2008). Yet as farming knowledge becomes increasingly mediated by digital platforms, it remains unclear whether agriculture is also seeing the emergence of digitally mediated actors who function as credible sources of environmental guidance for farmers.

On platforms such as Instagram and YouTube, virtual figures circulate ecological messages, blending symbolic performance with community-building to establish new channels of environmental communication (Hoai Lan et al. 2025). This work suggests that credibility and trust can be

reconfigured when knowledge is no longer monopolized by institutions but distributed openly across alternative, affective, and networked forms of authority (Rust et al. 2022). While digital environmental influencers have been studied in other sustainability domains, much less is known about how comparable figures operate within agricultural knowledge networks or how farmers interpret their credibility and usefulness relative to conventional advisory systems.

Across the Western world, interest in soil health has grown in response to the well-documented ecological degradation linked to conventional agricultural systems (USDA 2025; Smith et al. 2024). Agricultural soils are under significant pressure in Europe and globally. In the European Union (EU), up to 60–70% of soils show signs of degradation due to erosion, organic-matter loss, compaction, contamination, and biodiversity decline (European Parliament and Council of the European Union 2025). At the same time, the food system is a major driver of environmental change, contributing substantially to the transgression of several planetary boundaries, including those related to climate, biodiversity, and biogeochemical flows (Altieri 1999; Thorsøe et al. 2023; Wezel et al. 2009; Te Wierik et al. 2025; Smith et al. 2024).

In this article, soil-health-oriented farmers refers to farmers who explicitly prioritise soil biological, structural, or ecological functioning as a central concern in their farming practice. This includes, but is not limited to, regenerative, no-till, conservation agriculture, and other approaches that often extend beyond what is formally recognised or rewarded within conventional advisory schemes, certification systems, or market arrangements. These pressures raise practical and ethical concerns about how farmers learn to interpret soil health, how they decide what counts as credible expertise, and how particular forms of knowledge gain legitimacy in moments of ecological urgency.

Recent work suggests that many soil-health-oriented communities bypass or supplement conventional advisory systems, such as university extension, state-funded programs, and private consultants, in favour of alternative channels (White et al. 2023; Beacham et al. 2023; Day and Cramer 2022; Skaalsveen et al. 2020). Instead, they assemble knowledge infrastructures through peer exchanges, online courses, podcasts, grassroots study circles, and the teachings of charismatic educators whose reach extends across borders. Such sources may differ from formal advisory institutions not only in content but also in accessibility, timing, and freedom from institutional or commercial obligations. In their research on agroecological principles and practices using narrative inquiry, Bendfeldt, McGonagle, and Niewolny (Bendfeldt et al. 2021) described farmer knowledge as rhizomatic and mycorrhizal, using this as a metaphor for farmers' socio-ecological networks and associations. What remains less clear is how digitally mediated educators fit within these mixed knowledge infrastructures relative to peer networks and formal advisory institutions.

One way to approach this gap is through the epistemic divide that farmers and scholars increasingly describe. Conventional advisory arrangements are often portrayed as part of a "farming by numbers" regime, where calculability and numerical assessment dominate expertise, in contrast to systemic and ecological ways of understanding soil as a living entity (Krzywoszynska 2024). This tension is visible among regenerative and no-till communities, for whom soil health is a central concern (Skaalsveen et al. 2020; Beacham et al. 2023; Kloppenburg 1991; Irvine et al. 2023). In the United States, regenerative Community-Supported Agriculture (CSA) initiatives and soil-health networks articulate similar shortcomings in their advisory landscapes and turn instead to a shared repertoire of international educational personalities and digital resources. This raises a key question for agricultural values research: what happens to legitimacy, trust, and the politics of expertise when farmers increasingly orient toward practice-based, value-aligned sources that operate outside conventional institutions?

In this article, we examine this question through the concept of soil influencers, defined as individuals, often farmers, consultants, or educators, who reach broad audiences through YouTube channels, podcasts, social media, websites, and popular books. Soil influencers are here analytically distinguished by three features:

1. they operate beyond a single local peer network and reach geographically dispersed audiences;
2. their authority is grounded in demonstrable practice and narrative credibility rather than institutional accreditation; and.
3. they actively frame soil health through interpretive lenses that reshape how farmers understand causality, care, and responsibility.

In this sense, soil influencers should not be understood simply as social media personalities, but as emerging intermediaries in contemporary agricultural knowledge infrastructures. Rather than treating them as mere information sources, we ask whether they function as influential intermediaries in farmers' sense-making about soil health: How significant are they in farmers' reported inspiration and decision-making, what kinds of credibility do they mobilize, and what explains the demand for them?

Empirically, the article draws on qualitative fieldwork among soil-health-oriented farmers in Virginia, US, to explore how farmers conceptualize soil, how they assemble knowledge networks, and how these networks relate to soil-care practices. To address these questions, this article

develops three interrelated contributions. The study conceptualises soil influencers as a distinct form of agricultural intermediary operating at the intersection of digital communication, experiential authority, and alternative agronomic imaginaries. Second, it argues that farmers' turn toward such figures reflects not merely an advisory gap, but a deeper epistemic conflict between complex and reductionist framings of soil. Third, it introduces the notion of "wicked solutions" to describe the iterative, interpretive, and place-based forms of support that farmers seek when soils are understood as complex and evolving systems.

Situated soil knowledge, resonance, and complex systems

This theoretical framing combines three complementary perspectives. First, drawing on situated knowledge and practice theory, soil understanding is approached as embodied, relational, and co-constituted through everyday engagement. Second, Burton's concept of good farmingship and Rosa's theory of resonance provide lenses for analysing how farmers evaluate and affiliate with particular knowledge sources. Third, agroecological work on complex systems helps explain why some farmers seek forms of guidance that support interpretation and adjustment rather than fixed prescriptions. Together, these perspectives allow the study to move from how soil knowledge is formed to why certain forms of expertise feel legitimate, meaningful, or alienating.

Farmers' understandings of soil are not universal truths but partial, embodied, and historically situated ways of knowing. As Haraway (1988) argues, knowledge is situated: it emerges from specific positions, practices, and material entanglements rather than from an objective view from nowhere. In agriculture, this means that what counts as soil knowledge is shaped by farmers' educational backgrounds, technical environments, and everyday engagements with their land.

Multiple studies have shown that farmers' interpretations of agricultural decision-support systems, data, and tools are deeply rooted in experiential, place-based understandings, highlighting how soil knowledge is enacted through particular histories and contexts (Bendfeldt et al. 2021; Lundström and Lindblom 2018; Ingram et al. 2010; Ingram 2008; Carolan 2008). From this perspective, soil knowledge is co-constituted through relationships among tools and technologies, institutional frameworks, and farmers' embodied encounters with soil textures, smells, and rhythms. Drawing on Mol's (2002) account of enactment, what counts as soil care can therefore be understood as emerging through the practices and relations in which farmers participate. Sensory and embodied engagements, such as inspecting soil by hand or observing plant-soil relations after rain, constitute forms of knowing that differ from those derived from laboratory analyses or technical assessments (Pink 2009).

At the same time, these understandings are shaped by broader institutional and cultural systems that privilege certain epistemologies. Agronomic training and advisory networks often promote quantitative, plant-centric approaches, while alternative movements, such as regenerative or agroecological farming, emphasize qualitative and soil-centric forms of care (Krzywoszynska 2019). As Douglas (1986) and others have argued, orientations toward practice are shaped by distinct cultural repertoires. This invites an empirical question central to this article: how do farmers come to understand soil either as something to be managed efficiently or as a living system to be cared for, and through which educational, advisory, and experiential pathways do these understandings take shape?

To interpret how farmers evaluate and align themselves with particular knowledge sources, this study draws especially on Burton's concept of good farmingship (Burton et al. 2020) and Rosa's theory of resonance (Rosa 2019). Burton directs attention to the normative dimension of agricultural practice: farmers' identities, values, and senses of competence shape what counts as appropriate care, skill, and responsibility. These standards are not fixed internal norms but are continually negotiated through interaction with peers, institutions, and material environments. What is recognised as good soil management therefore depends not only on measurable outcomes, but also on socially situated judgments about competence and responsibility.

Rosa's theory of resonance adds a relational and affective dimension to this analysis. Resonance describes a mode of engagement in which actors feel that the world, other people, or particular practices respond to them in a meaningful way, so that their own actions feel recognised and effective rather than alienated. Applied to farming, this perspective helps illuminate why certain advisory encounters or knowledge sources feel affirming and energising, while others generate frustration. What matters is not only whether advice is technically sound, but whether it responds to farmers' lived experience and ecological commitments in ways that feel recognisable and legitimate.

Combined, these perspectives allow soil knowledge to be analysed at two interconnected levels: as a normative practice shaped by standards of good farming, and as a relational process sustained through recognition and resonance. This framework enables the study to move beyond what farmers know about soil to how they come to trust, value, and affiliate with particular forms of expertise. In this way, soil care appears not merely as a technical endeavour, but as a moral and relational practice through which identities,

commitments, and knowledge infrastructures are continually negotiated.

Farming with complexity: agroecological perspectives on soil systems

Within agroecological scholarship, farming is commonly approached as a complex socio-ecological system rather than as a purely technical production activity. From this perspective, soils, crops, livestock, and farmers are linked through dynamic interactions, feedbacks, and context-dependent processes that unfold over time and across scales. Such systems cannot be fully understood by isolating individual variables or by assuming linear cause-and-effect relationships (Gunderson and Holling 2002; Francis et al. 2003).

A recurring distinction in this literature is therefore drawn between complicated and complex systems. Complicated systems may involve many interacting components, but they are in principle decomposable and can be managed through improved measurement, modelling, and optimisation. Complex systems, by contrast, are characterised by nonlinearity, emergence, and uncertainty. In agroecological contexts this means that soils and agroecosystems cannot be fully predicted or controlled through standardised inputs alone. Instead, understanding and managing such systems often requires ongoing observation, experimentation, and iterative engagement with place-specific conditions (Francis et al. 2003).

These perspectives echo the discussion of situated knowledge and care by showing how farming knowledge develops through practical engagement with living systems. When soils are approached as complex and evolving ecologies, learning about them becomes an experiential and interpretive process grounded in repeated encounters with particular landscapes, organisms, and management decisions. What counts as good soil management is therefore shaped not only by technical indicators, but also by farmers' attentiveness to ecological processes and by the social networks through which they learn to interpret these processes.

Seen in this light, the agroecological distinction between complex and complicated systems provides an important lens for the questions explored in this article. If farmers experience soils as complex and context-dependent systems, they may seek forms of guidance that support interpretation, experimentation, and iterative adjustment rather than fixed prescriptions. Understanding how such perspectives develop requires attention to farmers' learning pathways, educational encounters, and the knowledge networks through which particular understandings of soil circulate. Examining these networks helps illuminate why certain actors, including the soil influencers examined in this study, may become influential reference points for farmers seeking guidance in working with complex agroecosystems.

Methodology: eliciting soil understandings and learning pathways

This study follows a qualitative, interpretive research design grounded in anthropological approaches to knowledge-in-practice. Consistent with theoretical perspectives that conceptualize farming as a situated and embodied epistemic practice, the research examines how soil-health-oriented farmers understand what soils are, how they work, and how these understandings shape practices of care and management.

Case selection and context

Fieldwork took place in May-June 2025 in Virginia, USA. Collaboration with a regional university-based food systems research center enabled access to established networks of soil-oriented farmers and ongoing soil-focused research initiatives. As a European agroecology researcher conducting fieldwork in the United States, the first author approached participants as active practical experts and meaning-makers rather than as recipients of external expertise.

The case region includes the Shenandoah Valley and the New River Valley along the Blue Ridge Mountains in the Appalachian region. These valleys are characterised by intensive poultry and cattle production as well as corn and grain cultivation, while regenerative, no-till, and soil-health-oriented farming communities have also begun to emerge. The region is also home to Mennonite farming communities with long-standing alternative agricultural and value-chain practices; two informants identified as Mennonite, although they did not explicitly frame their decisions in religious terms.

This configuration allows examination of how alternative soil-health networks develop not in the absence of advisory institutions, but alongside and in tension with them. The case also offers contrast to Denmark, where regenerative initiatives likewise remain a minority within highly industrialised agricultural systems (Thorsøe et al. 2023). This makes such settings suitable for examining how emerging soil-care practices develop alongside knowledge networks that are not fully supported by dominant advisory, policy, or market structures.

In the United States, the predominant advisory environment for farmers is shaped by the land-grant university extension system and commercial agribusiness advisory firms. The land-grant model, embodied in cooperative extension and agricultural research and education centers,

Table 1 Informant characteristics

Category	Details
Participants	10 farmers
Gender	8 men, 2 women
Age range	30–80
Farm types represented	Mixed vegetable; livestock-integrated; regenerative grazing; diversified small-scale production; arable grain crop farming
Region	Shenandoah Valley and New River Valley, Virginia, USA
Agricultural / educational background	Mix of self-taught, generational farming backgrounds, and farmers with formal training (agronomy courses, regenerative agriculture trainings, short courses, farmer-led workshops).
Data collected	10 semi-structured interviews (60–120 min); 10 farmer-generated soil drawings; field notes and photographs

historically aimed to deliver public-science knowledge to farmers using a reciprocal participatory approach (Peters 2017), but has also been critiqued for alignment with large-scale agricultural paradigms and dependence on research funding and industry partnerships (Anderson et al. 2024; Barham et al. 2021). In parallel, many advisory firms maintain commercial relationships with agricultural chemical companies and deliver number-driven, input-leaning advice (Cook et al. 2021).

Two regional initiatives provide alternative knowledge infrastructures for soil-health farmers in Virginia. The Virginia Soil Health Coalition (VSHC) connects farmers, advisors, and researchers to advance soil-health awareness and practice across the state (Virginia Soil Health Coalition 2025). The Virginia Association for Biological Farming (VABF) promotes education, peer learning, and advocacy for ecological and regenerative agriculture through workshops and its annual conference (Virginia Association for Biological Farming 2025). Scholars of AKIS note that U.S. advisory structures differ from many EU contexts, which often emphasise farmer-researcher-advisor innovation networks (Pascucci and De-Magistris 2011).

Research design

Access to farmers was facilitated through affiliation with the regional university in question[1]. Participants had already expressed interest in soil-health research, demonstrated ongoing engagement with practices aimed at improving soil conditions, and agreed that audio recordings and drawings could be used anonymously for research purposes. They were contacted through email, telephone, or referrals from regional university researchers with existing trust relationships[2].

Participant selection

Fifteen farmers were contacted; ten agreed to participate. All were actively farming in Virginia and self-identified as practicing regenerative, conservation agriculture, or otherwise soil health farming approaches. Selection was purposive, aiming to include practitioners engaged in soil health as a deliberate component of their farming philosophy. Table 1 below summarises the main characteristics of the participating farmers and the data collected.

Data collection

Interviews followed a semi-structured format (Brinkmann and Kvale 2014; Kaijser and Öhlander 2011) organised around four thematic clusters: (1) farmers' conceptualisations of soil processes, (2) learning histories and formative influences, (3) advisory encounters and trusted knowledge sources, and (4) everyday soil-care practices. Interviews typically opened with broad prompts such as: "How would you describe your soil and how it works?" Follow-up questions probed how these understandings had developed over time, including educational background, key turning points, influential individuals, and moments of dissatisfaction with advisory systems. Learning histories were explored through questions such as: "Where did you first encounter these ideas?" and "Whose work or teaching has shaped your thinking most?"

To support this dialogical approach, the interviews incorporated a draw-and-tell technique in which farmers sketched their soil system in cross-section before discussing it. The technique was used as an elicitation device rather than as a separate visual dataset, helping participants externalise tacit, embodied, and spatial forms of environmental knowledge (Crang and Cook 2007). The drawing phase provided time for reflection and opened discussion about what farmers considered most salient in their soils, including which elements they perceived as alive or active, how they imagined spatial relations within the soil profile, and which processes they viewed as central to soil functioning. This approach aligns with research exploring mental models and ecological reasoning (Gray et al. 2015).

The drawings then guided follow-up questions about where such understandings originated, whether through

[1] Inclusion under existing IRB-approved (Institutional Review Board) research protocols for soil-related farming studies.

[2] All participants provided written informed consent in line with U.S. IRB protocols, and supplementary GDPR consent was obtained to allow secure transfer and storage of interview and drawing data within the European Union under applicable data-protection and anonymity regulations.

experience, education, peer learning, or exposure to particular ideas or educators. In this way, the interviews became co-constructed conversations that brought forward both verbal and visual articulations of how farmers learn about and enact soil care in everyday practice. All interviews were audio-recorded and securely stored on university servers.

Data analysis

Interviews were fully transcribed using transcription software and then manually corrected. The material was analysed using abductive thematic analysis in NVivo. First-cycle coding stayed close to participants' language and identified recurring emphases in how farmers described (1) what soil is and how it functions, (2) how they had learned to think this way, and (3) how these understandings were enacted through everyday soil-care practices. In the second cycle, codes were consolidated into three analytic categories. These categories were not defined in advance but were selected because they represented the dominant clusters that repeatedly structured participants' accounts across interviews and drawing conversations: origins of soil understandings, current knowledge networks and inspiration sources, and practical enactments of soil care.

The drawings played a substantive role in shaping interpretation. Visual elements frequently foregrounded biological processes, such as fungi, root exudates, and microbial exchange, or structural features, such as pore space and aggregation. These elements guided subsequent probing during interviews and informed first-cycle coding. In several cases, the relative emphasis on biological complexity versus structural functionality helped refine the analytic distinction between more ecologically layered and more functionally oriented soil imaginaries.

Interpretation proceeded abductively through an iterative dialogue between empirical material and the study's theoretical framework. Concepts of situated knowledge, enactment, and care helped guide attention to how soils were imagined, valued, and acted upon differently across farming contexts, while Burton's notion of good farmingship and Rosa's concept of resonance informed interpretation of how farmers evaluated and affiliated with particular knowledge sources.

Reproducibility and Reflexivity

The coding framework, interview guide, and anonymised drawing material are archived on secured institutional servers. Field notes and reflexive memos documented the analytical process and the first author's positionality as a European agroecology researcher engaging with U.S. soil-care communities.

Taken together, this methodological approach foregrounds farmers' own conceptualisations and learning pathways, allowing analysis of how soil knowledge is imagined, acquired, and enacted in practice. It also makes it possible to examine how different knowledge sources become meaningful to farmers and how these sources shape the ways soils are interpreted and managed. In the following section, three themes illustrate how soil-health-oriented farmers conceptualise their soils, how their knowledge networks take shape, and how these understandings are enacted through everyday practices of soil care.

Results: soil understandings, knowledge networks, and practices of care

Soil Understandings: How farmers conceptualize soil and its functioning

Farmers in this study expressed varied understandings of how soil functions and what constitutes a healthy, thriving soil. While different elements were emphasized by different participants, they shared a general tendency to describe soil as a living, interacting system rather than as a substrate whose fertility is adjusted through inputs - a view that has historically characterized dominant agronomic paradigms (Altieri 1999; Francis et al. 2003). Their explanations can be understood along a spectrum of complexity, but this should be read as an interpretive continuum rather than as a fixed classification of farmers. At the more functional end, some participants emphasised outcomes such as soil structure, infiltration, yield stability, or reduced compaction, often associated with no-till or conservation practices. At the more ecologically layered end, especially among farmers identifying with regenerative approaches, participants described soils as adaptive multispecies systems shaped by biological relationships, temporal change, and feedbacks among roots, organisms, water, and management. Most informants moved between these positions depending on the practice or problem under discussion. The spectrum therefore helps clarify differences in emphasis: from soil as a system to be improved through better management, to soil as a living ecology to be interpreted, supported, and cared for over time.

> Elaine Ingham… she was the first person who talked about the soil food web and how much soil is living… hearing from her perspective how important feeding the soil was and limiting tillage, and just that there's a lot of life in there. That it's not just dirt, but the soil food web, and what's in there, and what's happening.

Elaine Ingham is the founder of the Soil Food Web School (Ingham 2025).

This reflects a broader pattern in the study, where farmers spoke of soil as animated, interdependent, and responsive - an ecological system that requires care and attentiveness rather than correction by chemical or mechanical input.

Alongside biological descriptions, many farmers explained soil health through the physical and functional properties of soil structure. These accounts often centered on how soils hold water, allow roots to penetrate, or respond to seasonal conditions such as freezing and thawing. For one vegetable grower, soil structure was imagined as a system of "air pockets" created by decomposing roots, spaces that enable nutrient flow and healthy root development: "The daikon radish (…) it decomposes over the winter and creates these air pockets… it almost looks like a sponge."

Others highlighted soil processes such as infiltration and freeze to thawing cycles as the drivers of structure. As one farmer explained, winter-killed roots leave channels that "improve water infiltration… freezing tends to loosen up your soil, including some of the subsoil."

Several described structure in more functional terms, emphasizing drainage, tilth, and resilience: "It drains well… the water soaks in but it also holds it… by spring it'll be like loamy, just ideal every year."

All things considered, these explanations illustrate the spectrum of soil understandings among farmers. Structure is seen not only as a physical property but as the outcome of interacting processes, plant roots, organic amendments, moisture, and climate cycles - though for some - described in more practical and less explicitly biological terms than among the most regenerative informants.

For most farmers in this study, and especially those who consider themselves regenerative, soil health was not only a biological or structural concept but an experiential quality - something assessed through sight, touch, smell, and long-term observation. These farmers emphasized that soil health reveals itself in practice through the behaviour of plants, through the attentive tactile sensing of the soil, the presence of organisms, and the resilience of soils and fields under stress. Such sensory ways of knowing sit at the core of situated knowledge: they are committed to learning through repeated engagement with the same place, season after season, and form an important complement to more formalized or data-driven notions of soil health.

One regenerative grazing cattle farmer described soil evaluation as a form of "reading the land" where plant response and field-level resilience offer more trustworthy indicators than laboratory results:

> I can just look… I can just see the plants are healthy. I know what a healthy plant looks like. I know what a healthy animal looks like. Those are my best frame.

Here, soil health is inferred through plant vitality and system behaviour, rather than numerical soil-test parameters. This approach positions soil as something that must be felt and observed, an assessment embedded in the rhythms of everyday farming. Another vegetable grower similarly tied soil health to tactile and visual cues, describing how winter freeze–thaw cycles transform compacted soil into a workable loam by spring.

Such descriptions highlight soil as a dynamic material that reveals its condition through texture, moisture behaviour, and seasonal change. These farmers rely on embodied agronomic judgement, the feel of crumbly loam, the ease of root penetration, or the appearance of earthworms, as key indicators of soil functioning. These farmers trust their practices to work, and leaves it up to certain ecosystem dynamics, to take care of itself, if it is cared for in the first place.

Several participants also emphasized learning through slow observation across years, especially regarding drought resilience and crop response. As one no-till farmer noted, his ability to produce strong crops in dry seasons was not *only* attributed to inputs or soil tests but to the accumulated evidence of his own fields over time. In these accounts, soil health is empirical but not laboratory based. It is produced through lived experience, attunement, and a farmer's intimate familiarity with their land.

Taken together, these experiential forms of farming knowledge can be understood as one way in which soil health is approached among participants in this study. They highlight an attentive, place-based reading of soil processes that relies on observation, sensory engagement, and familiarity developed over time. For some farmers, these ways of knowing appeared to sit uneasily alongside advisory approaches that prioritise standardised metrics, which helps contextualise why several participants later described limits to the relevance of conventional soil-health advice for their own fields.

Knowledge networks: assembling soil knowledge: peers, extension, and soil influencers

Across the ten interviews, farmers consistently described their learning environments as plural, improvised, and only partially aligned with formal advisory structures. Rather than relying primarily on extension agents or agribusiness consultants, farmers assembled hybrid knowledge networks composed of peer farmers, regional associations, online courses, books, podcasts, and a set of high-profile regenerative educators. These networks supported everyday

problem-solving, long-term philosophical orientation, and experimentation on their farms. Here are the different knowledge sources listed and presented.

Peer farmers and farmer-led organisations as epistemic anchors

For nearly all informants, peer farmers served as the most trusted and frequently used source of knowledge. Importantly, these were not just any farmers, but those who shared similar values, farming philosophies, or commitments to soil-health approaches. Learning occurred through informal conversations, farm visits, mentoring relationships, and farmer-led conference sessions, where advice was perceived as grounded in comparable constraints and aspirations. As one vegetable grower explained:

> I get my information most from farmers… if I go to the Virginia Association for Biological Farmers conference, for the most part I'm going to hear farmers. I feel like that's where I get the best information.

Here, preferred information referred not to formal credentials but to contextually relevant, field-tested knowledge from peers working under similar ecological and economic conditions. In this way, peer networks functioned as a primary epistemic community, defined as much by shared values and farming logics as by shared practices. Similarly, a grazing livestock farmer highlighted the importance of a long-term mentor:

> He's been an absolute essential resource… if I have problems, I can call him. I don't call the extension agent… they just don't even know what we're doing.

Peer networks were also central for younger farmers building farms on nontraditional sites:

> The peer network has been invaluable… I don't really know if I'd have it (the farm operation) without the young farmers one (a young farmers organisation group).

These peer relations were often facilitated and reinforced through regional farmer-led organizations such as the Virginia Association for Biological Farming (VABF). Several farmers described such organizations as important intermediaries that created spaces for exchange, identity formation, and learning across diverse ecological practices. For some participants, involvement in VABF coincided with critical turning points in their farming trajectories, including moments where continuing within conventional agriculture had become untenable due to health concerns or ecological doubts. As one farmer recalled:

> Early in the 1990s we joined the Virginia Association of Biological Farmers about the time that I had to get off the dairy farm… I became chronically ill largely because of a lot of the pesticide exposure and the chemicals we were using… so I got so sick I had to quit the dairy farm.

In this account, the organization functioned not only as a learning platform but also as a practical entry point into a community of farmers pursuing alternative approaches to soil and farming at a time when leaving conventional systems required new networks of support and knowledge.

Several farmers also noted that these organizations felt more trustworthy precisely because they operated independently of commercial or political interests. This independence contrasted with their more cautious engagement with formal advisory systems, where alignment of values and purposes was perceived as less certain.

Selective engagement with extension and formal advice

Although all participants were aware of extension services and had interacted with them to some extent, this engagement was *generally* cautious and selective. Extension was described as helpful for discrete technical tasks, such as basic soil tests or conservation paperwork, but not as a source of guidance for the ecological or systems-based approaches these farmers were pursuing. The dominant sentiment was that extension operated within a different agricultural logic, one centered on inputs, prescriptions, and standardized recommendations. For farmers working with soil as a living system, this created a sense of epistemic distance. One organic grower summarized this structural misalignment:

> I don't go to the extension talks because… they don't offer organic. There's very limited understanding or knowledge of soil health. Even calling our extension agent… they didn't know what to do with us.

This quote illustrates how extension was experienced not simply as unhelpful, but as oriented toward a different set of problems and practices. What extension could offer did not map onto the forms of knowledge these farmers needed for regenerative or organic systems. A cattle grazing farmer described this divergence as rooted in contrasting ways of thinking about soil and farming:

> It's a whole way of thinking… they're going to want to take a soil test and figure out what inputs to put. I'm

> not wanting to fix my symptoms. I want my system to be healthy.

In this account, the farmer distinguishes between input-focused problem solving and a more systems-oriented way of approaching farming. This distinction reflects different emphases in how soil management is discussed and enacted.

Other participants pointed to institutional constraints and lack of alignment with university actors:

> Most of those professors… had no interest in coming out to this farm… I thought running a (university associated) farm I would be continuously learning… but I was hitting a wall.

This suggests a perceived disconnect between the lived realities of innovative farm systems and the institutional settings that traditionally define agricultural expertise.

At the same time, extension and related services such as the Natural Resources Conservation Service (NRCS), part of the United States Department of Agriculture (USDA), were still valued for specific, bounded functions. Participants used them for soil testing, conservation programs, or regulatory guidance. Extension was therefore not rejected outright but rather positioned as insufficient for farmers seeking more holistic, practice-based, and ecologically grounded forms of advice.

Soil influencers as travelling intermediaries of soil-health knowledge

Across interviews, participants described digital platforms, books, and practitioner-led courses as an increasingly important layer within their knowledge networks. These sources did not replace peer farmers or regional organizations, but they provided access to a wider set of practitioners experimenting with soil-health approaches across North America and beyond. This is where the concept of soil influencers becomes analytically central: these actors were not simply additional sources of information, but figures through whom soil-health ideas, practical techniques, and interpretive frames travelled across otherwise dispersed farming communities.

Farmers repeatedly emphasized that the credibility of these figures rested less on institutional credentials than on demonstrated practice. What mattered was that these educators had experimented with soil-health approaches on their own farms and translated those experiences into accessible explanations. As one farmer explained when describing the appeal of several regenerative educators, also mentioned across other interviews:

> He speaks to me because he's another farmer that's successful… people monetize the information… they come up with a course.

Here, "successful" referred not simply to financial success but to having made ecological soil-health practices work under real farming conditions. Several interviewees described structured training programs connected to these networks and also referred to widely circulated regenerative agricultural influencers that translate ecological soil processes into practical farm-management narratives (Brown 2018; Estabrook 2025; Fortier 2014; Schwartz 2013).

One farmer explained how their engagement with regenerative agriculture began through courses associated with the Understanding Ag network (Brown 2018):

> I reached out to this company… Understanding Ag… that's how I met Dr. Allen Williams and Gabe Brown… I took in-depth classes… regenerative agriculture 101.

These programs were valued for translating ecological concepts into practical decision-making frameworks and field-level observation techniques. For instance, another farmer described learning key diagnostic approaches through training sessions with Allen Williams, where participants were taught to interpret soil structure and biological activity directly in the field using shovel tests and other observational methods. In this sense, soil influencers did not only offer content about soil health; they provided ways of seeing, diagnosing, and narrating soil processes that farmers could bring back into their own fields.

Podcasts and online media also functioned as continuous learning environments. Several farmers described regularly listening to practitioner-oriented programs that share farm experiences, grazing strategies, or no-till vegetable production methods. One participant described learning practical techniques through the No-Till Growers podcast (No-Till 2024):

> I go to No-Till Growers… it's a YouTube and a podcast… he just kind of has annual gardening tips and whatnot.

Another interviewee highlighted the value of the Stockman Grass Farmer podcast (The Stockman Grass Farmer 2024) as a way to keep up with discussions among grazing practitioners:

> Stockman Grass Farmer… it's small enough… but you can find them all there (on podcast providing platforms).

Such platforms were described as particularly useful for staying connected to evolving practices and farmer experiences beyond the local region. Books and earlier educational materials also played an important role in shaping farmers' conceptual understandings of soil and ecological processes. Several participants referred to long-standing influences such as the Rodale Institute (Rodale Institute n.d.), while others described how widely circulated writers and educators helped reframe water, grazing, carbon, and soil biology in more systemic terms.

Farmers also described everyday engagement with digital platforms as part of their ongoing learning. Social media and online browsing were used to follow other farmers' experiments, observe field techniques, and discover new approaches. As one participant summarized:

> Now… there's social media… there are courses… you can go and follow different farmers.

While these platforms were rarely described as replacing local knowledge networks, farmers valued them as a way to access practical experimentation and experiences unfolding beyond their immediate regions. Several farmers described digital platforms as a relatively recent addition to their learning environments, contrasting earlier periods when knowledge circulated primarily through local meetings, printed materials, or nearby peers with the present situation in which courses, podcasts, and social media make it possible to follow farmers and educators across regions.

Taken together, these examples suggest that digitally mediated educators have become an important component of the knowledge infrastructures that farmers assemble when exploring soil-health approaches. Peer farmers and regional organisations remained central sources of situated learning, but online courses, podcasts, books, and widely circulated practitioners extended access to ideas and experiences emerging elsewhere. The figures referred to here as soil influencers therefore functioned not simply as information sources but as intermediaries through which soil-health ideas, practices, and interpretive frameworks circulated across farming communities. Their authority was rarely described in terms of formal credentials, but rather in terms of demonstrated practice, narrative credibility, and the perceived alignment between their experiences and farmers' own attempts to understand soils as living systems. This stronger intermediary role helps explain why soil influencers remain central to the article's argument: they make visible how agricultural expertise is being reorganised across digital, experiential, and peer-based knowledge infrastructures.

Enacting soil care: observation, adjustment, and everyday compromise

Across the interviews, farmers described soil care as something they learn into over time. Practices were presented not only as management choices, but also as ongoing ways of noticing what the soil is doing and adjusting interventions accordingly. In this sense, farmers' soil care can be read as a continuous production of situated knowledge, grounded in repeated engagement with particular fields, seasons, and constraints.

One recurring enactment of care was the effort to minimise soil disturbance. For some, especially long-term no-till farmers, reduced tillage was described as a practical way to protect structure, limit compaction, and manage workloads. Others framed the same move as a way of giving soil biological processes time and space to organise. One farmer described chisel-plough tillage as a compromise between no-till ideals and the practical need to prepare a seedbed: "I do some tillage… chisel plow tillage is sort of a good go-between between no tillage… versus moldboard tillage."

Cover crops and diverse plantings were likewise framed as practical interventions that also served as ways to observe and support soil functioning. Farmers described using mixtures to prevent erosion, improve rooting depth, suppress weeds, or keep something living in the ground. One farmer explained: "I believe that we need a cover crop to help keep the ground, give it a rest also, but help to bring back some of the organic matter… we leave at least half of it to go back into the soil for the next year." When asked how this affected the soil ecosystem, the same farmer added: "It's helping the earthworms because if you have bare soil, then there's nothing for them to eat… as long as they have something on top, it's decaying it back into the ground. It's keeping everything alive underneath there."

Another farmer connected cover crops to reduced dependence on purchased inputs, framing soil care as substitution rather than elimination: "If I'm going to use less nitrogen I have to have this cover crop legume cover crop… I'm getting organic matter, I'm getting roots coming in the ground, I'm getting a place that will draw in insects, good insects that'll eat the bad ones." Such accounts show how soil-care practices were valued not only for single outcomes but for the relationships they were thought to set in motion among roots, insects, microbes, organic matter, and farm economics.

Livestock farmers described grazing as another key site where soil care and knowledge production became intertwined. Rotating animals, adjusting rest periods, and watching regrowth were presented as practical decisions but also as a way of reading whether the land was responding as

intended. One cattle grazing farmer captured this form of place-based assessment:

> For me the real thing is that you can look out there and suddenly I am growing a lot more grass. That is when I know I have more water retention, more carbon retention, more organic material. Over there on the newer land it was way behind, but here grass was growing even when we had no rain. You would not even know it was a different year.

Here, soil care is enacted through attentive observation of plant response and field resilience, which becomes the basis for judging whether the system is improving. Farmers also described tensions between soil-care ideals and everyday constraints. Weather, labour, markets, machinery, and farm type shaped what was possible and when. These constraints do not weaken the soil-care orientation but show that care is enacted within specific material and economic conditions and therefore takes different forms across farms.

Taken together, these enactments show soil care as iterative and interpretive, grounded in attentiveness to local outcomes and in learning through repeated engagement. This mode of knowing sits somewhat uneasily with advisory systems built around standardised recommendations and narrow metrics, because what farmers described needing was often support for judgement, interpretation, and adaptation rather than prescriptions.

From soil understandings to knowledge ecologies: recap of findings

Taken together, the results show how farmers' soil understandings, knowledge networks, and soil-care practices were closely intertwined, yet varied along a spectrum rather than forming fixed categories. Farmers who articulated more ecological, process-oriented, and experiential understandings of soil tended to assemble broader and more heterogeneous knowledge networks. These networks commonly combined peer farmers, regional organisations, and practice-based soil influencers whose ways of talking about soil and farming resonated with how participants themselves understood soil as a living and dynamic system.

Across interviews, farmers described their learning environments as plural and self-assembled rather than oriented around a single advisory source. Five components were especially prominent: peer farmers and local mentors providing context-specific and actionable learning; regional organisations functioning as hubs for exchange and belonging; selective engagement with extension services and NRCS for specific technical purposes such as soil tests or administrative programmes; soil influencers offering regenerative frameworks and techniques; and books and ecological literature that helped reframe soil, water, and grazing in more systemic terms. Formal advisory systems were not abandoned but positioned as one element within a broader knowledge ecology that farmers assembled over time.

These knowledge networks were enacted through soil-care practices that emphasised observation, attentiveness, and ongoing adjustment rather than the application of standardised prescriptions. Across cases, dissatisfaction with conventional advisory did not reflect outright rejection, but a perceived misalignment between farmers' situated ways of knowing and advisory approaches centred on generalised metrics and input-based recommendations.

Discussion: from advisory gaps to epistemic realignment

The discussion develops three interrelated arguments. First, the findings point to an epistemic conflict between complex ecological framings of soil and advisory systems that often treat soils as complicated but optimisable systems. Second, farmers' gravitation toward alternative knowledge networks can be understood through processes of resonance and recognition. Third, the appeal of what I term wicked solutions reflects a search for advisory forms capable of working with uncertainty, iteration, and place-specific judgement. Similar tensions between soil-health-oriented farming practices and dominant advisory structures have been noted in recent studies of regenerative and conservation agriculture (Skaalsveen et al. 2020; Beacham et al. 2023; White et al. 2023).

Importantly, the analysis does not attempt to evaluate whether the knowledge promoted by soil influencers is more or less agronomically valid than that offered through extension services or other advisory institutions. Rather, the focus is on how farmers themselves describe the credibility and usefulness of different sources of knowledge, and why certain forms of expertise appear to resonate more strongly with their own experiences of soil and ecosystem management.

From advisory gap to epistemic conflict: complex soils in complicated advisory frames

A central implication of the findings is that farmers' reported dissatisfaction cannot be reduced to a narrow problem in the advisory system. Similar patterns have been documented in studies showing that farmers pursuing soil-health or regenerative practices often experience tensions with advisory systems oriented toward standardised recommendations and input-based optimisation (Krzywoszynska 2024;

Skaalsveen et al. 2020; Irvine et al. 2023). The results presented here suggest a deeper epistemic conflict about what soils are and what it means to work with them.

For many informants, soil health was understood as adaptive, interdependent, and place-specific, revealing itself through observation and iterative adjustment. When advisory encounters were experienced as dominated by standardised recommendations and input-oriented metrics, this was perceived not only as practically unhelpful but also as grounded in a reductionist style that struggled to account for the soil dynamics farmers observed in their fields. Farmers' knowledge networks were therefore not merely compensatory information-seeking arrangements. They were also forms of epistemic affiliation with ways of knowing that resonated with farmers' ecological commitments and lived experience. Earlier work has similarly shown that farmers' learning often unfolds through informal networks and experiential knowledge infrastructures rather than through formal advisory channels alone (Bendfeldt et al. 2021; White et al. 2023).

Recognition and resonance in alternative knowledge networks

Several farmers described conventional advisory encounters as situations in which their practices, values, and overall farming logic were insufficiently understood or acknowledged. Similar dynamics of mistrust or misalignment between farmers and advisory institutions have been observed in previous research on agricultural knowledge exchange and advisory systems (Rust et al. 2022; Nettle et al. 2018). In this light, the turn toward peer farmers, regional organisations, and regenerative educators can be read not only as a pragmatic search for technical support, but also as a search for recognition and meaningful engagement.

This dynamic can be interpreted through resonance. Rosa describes resonance as a relational mode in which individuals feel meaningfully engaged by people, practices, or environments and experience their own responses as effective rather than alienated. Applied to agricultural advisory, resonance helps illuminate why some farmers described extension encounters as unsatisfying or alienating: not because advisors necessarily lacked goodwill, but because the interaction failed to engage with farmers' ways of sensing, interpreting, and valuing soil processes. Alternative knowledge infrastructures therefore do more than circulate information. They offer spaces where farmers' practices are recognised as legitimate, where experiential knowledge is taken seriously, and where shared language allows farmers to articulate what they are trying to do without translating it into unfamiliar epistemic formats.

At the same time, this dynamic points to a potential pitfall. When soil-health-oriented farmers withdraw into parallel knowledge networks because dominant advisory systems fail to resonate with their practices, the risk is not only institutional fragmentation but growing mutual incomprehension. Soil-health movements may become further alienated from public advisory structures and from more conventional farmers, while advisory systems risk losing relevance for those engaging most actively with ecological complexity. Rather than a simple rejection of extension, the material points to a relational challenge: how advisory institutions might engage emerging forms of soil care without abandoning scientific credibility or public accountability.

Complex soils and the appeal of wicked solutions

The resonance perspective highlights why farmers may feel unheard or misaligned in advisory encounters, but it does not entirely explain why such experiences recur across otherwise well-intentioned institutional settings. To understand this recurring misalignment, it is useful to consider how soils themselves are framed epistemically. Within systems theory and agroecological scholarship, a common distinction is made between complicated and complex systems (Gunderson and Holling 2002; Francis et al. 2003). Complicated systems may be difficult to manage, but they are in principle decomposable, predictable, and correctable through improved measurement, modelling, and targeted intervention. Many conventional advisory approaches implicitly rest on this mechanistic logic by treating soil problems as variables to be diagnosed and adjusted through inputs, indicators, and standardised recommendations.

By contrast, complex systems are characterised by nonlinearity, adaptation, and emergent outcomes that cannot be reliably predicted or optimised in advance. Several farmers in this study described soils in ways that align more closely with this latter understanding, as has also been documented in studies of farmer perceptions of soil health and regenerative agriculture (Irvine et al. 2023; Klein et al. 2024). Especially among regenerative-oriented participants, soils were portrayed as multispecies ecologies whose behaviour unfolds over time and differs across fields, seasons, and management histories. In such accounts, learning occurs through engagement and observation rather than optimisation, and improvement is provisional rather than final.

This way of understanding soils echoes the notion of wicked problems. Wicked problems are problems for which there is no definitive formulation, no single correct solution, and no clear stopping rule (Rittel and Webber 1973). They are problems where interventions change the problem itself and where learning emerges through action rather than prior calculation. When soils are experienced as complex and

evolving, attempts to manage them through linear input-output logic may feel inadequate or misleading. Advisory recommendations designed to correct isolated variables may fail to engage with the uncertainty, interdependence, and temporal depth that farmers encounter in their fields.

It is in this context that the appeal of wicked solutions becomes visible. The results suggest that farmers who experience soils as complex tend to seek support that mirrors this complexity: approaches that are iterative rather than final, interpretive rather than prescriptive, and place-based rather than universal. These solutions do not promise control or optimisation but support learning, adjustment, and ongoing sense-making. This perspective should be read as an interpretive tendency rather than a quantified rule for all farmers.

The study does not point to the informants' uniform rejection of conventional advisory systems. Instead, it reveals a spectrum of knowledge and diverse understandings among and within farmers. Farmers with more moderate or functionally oriented soil-health approaches often found value in extension services for specific tasks, while those with more complex, regenerative understandings expressed stronger dissatisfaction and a greater need for alternative knowledge infrastructures. As soil is increasingly understood as complex or wicked, the demand for advisory support capable of working with uncertainty, judgement, and adaptation appears to intensify. This observation resonates with broader discussions about the need for advisory systems capable of supporting farmer experimentation and learning within complex socio-ecological systems (Rust et al. 2022; White et al. 2023).

Conclusion

This article set out to examine how soil-health-oriented farmers in Virginia understand soils, how these understandings are formed and sustained through their knowledge networks, and how they are enacted in everyday soil-care practices. Across the interviews, farmers generally described soils as living, processual, and learned through attentive engagement over time. In parallel, they assembled plural knowledge ecologies that combined peer farmers, regional organisations, selective use of extension and NRCS, and a growing reliance on soil influencers, including online educators, courses, podcasts, books, and social media.

Taken together, this configuration signals not simply diversification of learning sources, but a subtle reconfiguration of epistemic authority within contemporary agriculture, where credibility is increasingly negotiated across institutional and non-institutional arenas. Soil influencers have become meaningful nodes in these knowledge networks because they offer practice-based narratives, techniques, and interpretive frames that resonate with how many farmers in this study describe learning to read and work with soil. Rather than replacing formal advisory outright, these sources are layered into a working infrastructure of learning that farmers build over time.

Conceptually, the article proposes that the more farmers approach soils as complex and evolving systems, the more they seek what can be termed wicked solutions: forms of support that are iterative, interpretive, and place-based rather than final, prescriptive, and standardised. For example, future research could examine whether farmers working with drought resilience, cover-crop experimentation, or reduced-input transitions similarly seek advisory support that helps them interpret changing field conditions rather than simply prescribe a fixed input package. This points to an advisory challenge that is not only about adding regenerative content, but about developing advisory formats that can engage with uncertainty, judgement, and situated learning while maintaining public accountability and scientific credibility.

If authority continues to shift toward more decentralised and personality-driven knowledge infrastructures, advisory landscapes may become more plural and responsive, but also more fragmented. This raises important questions about coordination, collective learning, and the future role of publicly funded advisory institutions. Future research could test the wicked-solutions tendency across broader contexts and examine what hybrid advisory roles, institutional designs, or policy supports might enable productive alignment between public advisory systems and emerging soil-health knowledge cultures. Ultimately, the politics of soil knowledge is not only about technical correctness, but about recognition, responsibility, and whose ways of knowing are affirmed in shaping agricultural futures.

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Data availability The qualitative data generated and analysed during this study are not publicly available due to confidentiality agreements with research participants and institutional ethical requirements. Data

are securely stored on institutional servers and handled in accordance with relevant IRB protocols in the United States and GDPR regulations in the European Union. Access to anonymised data may be considered upon reasonable request to the corresponding author, subject to ethical approval and data protection requirements.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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References

Altieri, M. A. 1999. The ecological role of biodiversity in agroecosystems. *Agriculture Ecosystems & Environment* 74:19–31.

Anderson, J. D., T. Malone, and J. T. Akridge. 2024. Strategies for land-grant universities to foster public trust. *Journal of Agricultural and Applied Economics* 56(4):650–665. https://doi.org/10.1017/aae.2024.32

Barham, B., J. Foltz, and A. P. Melo. 2021. The enduring pursuit of public science at U.S. land-grant universities. *PLOS ONE* 16(11):e0259997. https://doi.org/10.1371/journal.pone.0259997

Beacham, J. D., P. Jackson, C. C. Jaworski, A. Krzywoszynska, and L. V. Dicks. 2023. Contextualising farmer perspectives on regenerative agriculture: A post-productivist future? *Journal of Rural Studies* 102:103100. https://doi.org/10.1016/j.jrurstud.2023.103100

Bendfeldt, E., M. McGonagle, and K. Niewolny. 2021. Rethinking farmer knowledge from soil to plate through narrative inquiry: An agroecological food systems perspective. *Journal of Agriculture Food Systems and Community Development* 11:137–151.

Brinkmann, S., and S. Kvale. 2014. *InterViews: Learning the Craft of Qualitative Research Interviewing*. London: Sage.

Brown, G. 2018. *Dirt to Soil: One Family's Journey into Regenerative Agriculture*. White River Junction: Chelsea Green.

Burton, R. J. F., J. Forney, P. Stock, and L.-A. Sutherland. 2020. *The Good Farmer: Culture and Identity in Food and Agriculture*. London: Routledge.

Carolan, M. S. 2008. More-than-representational knowledge/s of the countryside: How we think as bodies. *Sociologia Ruralis* 48:408–422.

Cook, B. R., P. Satizábal, and J. Curnow. 2021. Humanising agricultural extension: A review. *World Development* 140:105337. https://doi.org/10.1016/j.worlddev.2020.105337

Crang, M., and I. Cook. 2007. *Doing Ethnographies*. London: Sage.

Day, C., and S. Cramer. 2022. Transforming to a regenerative U.S. agriculture: The role of policy, process, and education. *Sustainability Science* 17:585–601. https://doi.org/10.1007/s11625-021-01041-7

Douglas, M. 1986. *How Institutions Think*. Syracuse: Syracuse University.

Estabrook, B. 2025. Meet Allan Savory, the pioneer of regenerative agriculture. *Agriculture*. https://www.agriculture.com/livestock/cattle/meet-allan-savory-the-pioneer-of-regenerative-agriculture. Accessed 9 June 2026.

European parliament and council of the european union. 2025. Directive (EU) 2025/2360 of the european parliament and of the council of 12 November 2025 on soil monitoring and resilience (Soil Monitoring Law). *Official Journal of the European Union*. https://eur-lex.europa.eu/eli/dir/2025/2360/oj/eng. Accessed 9 June 2026.

Fortier, J.-M. 2014. *The Market Gardener: A Successful Grower's Handbook for Small-Scale Organic Farming*. Gabriola Island: New Society.

Francis, C., G. Lieblein, S. Gliessman, T. Breland, N. Creamer, and R. Harwood et al. 2003. Agroecology: The ecology of food systems. *Journal of Sustainable Agriculture* 22:99–118.

Gray, S. A., S. Gray, J. L. De Kok, A. E. R. Helfgott, B. O'Dwyer, R. Jordan, and A. Nyaki. 2015. Using fuzzy cognitive mapping as a participatory approach to analyse change, preferred states, and perceived resilience of social-ecological systems. *Ecology and Society* 20.

Gunderson, L. H., and C. S. Holling. 2002. *Panarchy: Understanding Transformations in Human and Natural Systems*. Washington, DC: Island.

Haraway, D. 1988. Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist Studies* 14:575–599.

Hoai Lan, D., T. M. Tung, V. T. K. Oanh, and T. T. K. Cuc. 2025. The role of virtual influencers in environmental messaging: A case study of Noonoouri. *Environmental Sociology* 11:80–100. https://doi.org/10.1080/23251042.2024.2408702

Ingham, E. 2025. The soil food web school. https://www.soilfoodweb.com. Accessed 9 June 2026.

Ingram, J. 2008. Are farmers in England equipped to meet the knowledge challenge of sustainable soil management? *Journal of Environmental Management* 86:214–228.

Ingram, J., P. Fry, and A. Mathieu. 2010. Revealing different understandings of soil held by scientists and farmers in the context of soil protection and management. *Land Use Policy* 27:51–60.

Irvine, R., M. Houser, S. T. Marquart-Pyatt, G. Bogar, L. G. Bolin, and E. G. Browning et al. 2023. Soil health through farmers' eyes: Toward a better understanding of how farmers view, value, and manage for healthier soils. *Journal of Soil and Water Conservation* 78:82–92.

Kaijser, L., and M. Öhlander. 2011. *Etnologiskt fältarbete*. Lund: Studentlitteratur.

Klein, A. O., L. Carlisle, M. G. Lloyd, N. F. Sayre, and T. M. Bowles. 2024. Understanding farmer knowledge of soil and soil management. *Agroecology and Sustainable Food Systems* 48:17–49.

Klerkx, L., N. Aarts, and C. Leeuwis. 2010. Adaptive management in agricultural innovation systems. *Agricultural Systems* 103:390–400.

Kloppenburg, J. 1991. Social theory and the de/reconstruction of agricultural science. *Rural Sociology* 56:519–548.

Krzywoszynska, A. 2019. Caring for soil life in the Anthropocene. *Transactions of the Institute of British Geographers* 44:661–675.

Krzywoszynska, A. 2024. You can't manage what you can't measure: Regenerative agriculture, farming by numbers, and calculability in soil microbiopolitics. *Environment and Planning E: Nature and Space* 7(4):1691–1710. https://doi.org/10.1177/25148486241246498

Lundström, C., and J. Lindblom. 2018. Considering farmers' situated knowledge when using agricultural decision support systems. *Agricultural Systems* 159:9–20.

Mol, A. 2002. *The Body Multiple: Ontology in Medical Practice*. Durham: Duke University Press.
Nettle, R., A. Crawford, and P. Brightling. 2018. How private-sector farm advisors change their practices. *Journal of Rural Studies* 58:20–27.
No-Till, Growers. 2024. No-till growers podcast. https://www.notillgrowers.com. Accessed 9 June 2026.
Pascucci, S., and T. De-Magistris. 2011. The effects of changing regional agricultural knowledge and innovation systems on Italian farmers' strategies. *Agricultural Systems* 104:746–754.
Peters, S. J. 2017. Storying and restorying the land-grant system. In *The Land-Grant Colleges and the Reshaping of American Higher Education*, ed. R. L. Geiger, and N. M. Sorber. New Brunswick: Transaction. https://doi.org/10.4324/9781315132860-17
Pink, S. 2009. *Doing Sensory Ethnography*. London: Sage.
Rittel, H. W. J., and M. M. Webber. 1973. Dilemmas in a general theory of planning. *Policy Sciences* 4:155–169.
Rodale Institute. n.d. Rodale Institute. https://rodaleinstitute.org. Accessed 9 June 2026.
Rosa, H. 2019. *Resonance: A Sociology of Our Relationship to the World*. Cambridge: Polity.
Rust, N. A., P. Stankovics, R. M. Jarvis, Z. Morris-Trainor, J. R. De Vries, and J. Ingram et al. 2022. Have farmers had enough of experts? *Environmental Management* 69:31–44.
Schwartz, J. D. 2013. *Cows Save the Planet*. White River Junction: Chelsea Green.
Skaalsveen, K., J. Ingram, and J. Urquhart. 2020. The role of farmers' social networks in the implementation of no-till farming practices. *Agricultural Systems* 181:102824.
Smith, P., R. M. Poch, D. A. Lobb, R. Bhattacharyya, G. Alloush, and G. D. Eudoxie et al. 2024. Status of the world's soils. *Annual Review of Environment and Resources* 49:73–104. https://doi.org/10.1146/annurev-environ-030323-075629
Te Wierik, S., F. DeClerck, A. Beusen, D. Gerten, F. Maggi, A. Norberg, and K. Noone et al. 2025. Identifying the safe operating space for food systems. *Nature Food* 6:1153–1163. https://doi.org/10.1038/s43016-025-01252-6
The Stockman Grass Farmer. 2024. The Stockman Grass Farmer. https://stockmangrassfarmer.com. Accessed 9 June 2026.
Thorsøe, M. H., S. Keesstra, M. De Boever, K. Buchová, F. Bøe, and N. L. Castanheira et al. 2023. Sustainable soil management: Soil knowledge use and gaps in Europe. *European Journal of Soil Science* 74(6):e13439. https://doi.org/10.1111/ejss.13439
USDA. 2025. Soil Health. United states department of agriculture. https://www.usda.gov/soil-health. Accessed 9 June 2026.
Virginia Association for Biological Farming. 2025. Virginia association for biological farming. https://vabf.org. Accessed 9 June 2026.
Virginia Soil Health Coalition. 2025. Virginia soil health coalition. https://www.virginiasoilhealth.org. Accessed 9 June 2026.
Wezel, A., S. Bellon, T. Doré, C. Francis, and D. Vallod, C. David. 2009. Agroecology as a science, a movement and a practice. *Agronomy for Sustainable Development* 29:503–515.
White, A., J. W. Faulkner, M. T. Niles, D. Conner, and V. E. Méndez. 2023. The role of farmer networks in supporting adaptive capacity. *Elementa: Science of the Anthropocene*. 11.

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